

25th Australasian Conference on Information Systems
8th -10th Dec 2014, Auckland, New Zealand

Empowering Consumers in Food Value Chains
Bamgboje-Ayodele, Ellis & Turner

Empowering Consumers in Food Value Chains: Preliminary Insights from an Investigation into the Development of Tools for Food Safety

Adeola Bamgboje-Ayodele
Leonie Ellis
Paul Turner
School of Engineering and ICT
University of Tasmania, Australia
Adeola.Bamgboje@utas.edu.au
Leonie.Ellis@utas.edu.au
Paul.Turner@utas.edu.au

Abstract

Changes in the purchasing preferences, attitudes and behaviours of many consumers towards food has highlighted the increased appetite for more and better quality information on the safety, quality and provenance of food products and on the sustainability of food production.

This research-in-progress paper presents preliminary insights from an investigation into mechanisms for premium food producers to develop information services to both better understand and enhance food consumers' decision-making on food and food value chains based on quality, safety and provenance. Following a review of key literature on consumer technology adoption and use for decision-making, the paper outlines the conceptual framework and methodology being used in the investigation and reports on insights generated from the first industry case-study. The paper highlights continuing evidence gaps and outlines next steps towards the conduct of consumer focused data collection and analysis aimed at developing tools to enhance food safety during food recall incidents.

Keywords

Consumers, Decision making, Food Recall, Information Technology

INTRODUCTION

For the Australian food industry and in particular, the premium food industry, changing consumer expectations, higher quality and safety standards (Grunert 2005), the pervasiveness of mobile and social technologies and transformations in market access into the Asia-Pacific (DPMC 2012) have re-focused attention on the importance of optimizing information flows along supply chains to include end-consumers.

While some businesses have embraced the opportunity to value-add with information (Michaelidou et al. 2011; Stachowski 2012), the corporatized and multi-national structure of much global food production has led to continuing industry resistance to improved information transparency. Firstly, in a number of areas including food labelling, food regulation and international trade (Capling and Ravenhill 2011), lobbying by food industry representatives (Barker 2014) has impaired consumers' access to better quality information on food and food supply chains. Moreover, it has been argued by some that the global food industry is primarily focused on selling unhealthy food products characterised by high fat, sugar and salt (Kearney 2010) and as a result has a vested interest in the implementation of labelling restrictions through trade agreements (AMCHAM 2014). Aligned to this tendency, is the prevalence of product information misrepresentation when for example products are labelled "95% fat free" even though from a health perspective a product with 5% fat content is not actually regarded as a low fat product. Combined, these factors contribute to consumer confusion (Prinsloo et al. 2012). For many consumer advocates this situation is of concern, because of not just the confusion caused but also the potential for negative impacts on consumer health and safety relating to population health and individual food recall incidents.

Despite these barriers, many food businesses and interested consumers continue to try to innovate to enhance the flow and quality of information on foods and food chains (Ruiz-Garcia et al. 2010). Many food businesses want to better understand how differences in consumer's attributes influence the receipt and use of any information provided and in-turn how this impacts the decisions that consumer's make during individual purchases and about food types and brands. For firms producing premium products for a niche market, it becomes imperative to incorporate strategies that ensure brand differentiation through improved information transparency (Grunert

2005) so as to gain and retain consumer confidence in their product. Failure to do this poses a risk of being overshadowed by firms who impair consumer access to better quality information; thus leading to a potentially bleak future for firms producing healthy food products. As with other industry sectors, the adoption and use of mobile technology and social media is improving consumers' access to information (Heinonen 2011). However, it remains much less clear what modes of information delivery, modes of interaction and levels of content complexity are most appropriate and/or effective for different types of consumers. One problem that provides an opportunity to investigate these concerns in detail relates to food safety and more specifically food recall incidents where timely, relevant and accurate information is not only important for the food business but critical for the safety and health of consumers.

This research-in-progress paper presents preliminary insights from an investigation into mechanisms for premium food producers to develop information services to both better understand and enhance food consumers' decision-making on food and food value chains based on quality, safety and provenance. The paper presents a conceptual framework for structuring the research and the identification of food recall incidents as the foci for the primary investigation, tool development and evaluation with consumers. The developing over-arching methodology is outlined and the specific tools and techniques used in the conduct of the initial case study with a premium food business are introduced. The paper presents the preliminary findings from the case study and discusses implications for the developing over-arching methodology and innovative approaches for engaging food consumers.

FOOD RECALLS – AN AUSTRALIAN OUTLOOK

In Australia, over 600 food recalls have occurred between 2003 and 2013 (ACCC 2014). In order to put this into a clearer perspective, some of the recalls relating to perishable premium food products were due to listeria monocytogenes contamination and consumers were asked not to eat these products but to return them to the place of purchase for a full refund. (ACCC 2014). The contaminant could potentially cause pregnant women to fall ill, cause illnesses to the elderly, hurt people with weak immune systems; and in extreme cases, it could lead to death (Böcker 2002). According to FSANZ (2008), a recall is an "action taken to remove from *distribution, sale and consumption*, food which may pose a health and safety risk to consumers". The two levels involved are the trade recall (excludes consumers) and the consumer recall (includes consumers). During a normal business process, primary production and processing businesses are required to maintain traceability records of immediate recipients and immediate suppliers so as to easily identify and locate food products when incidents arise. The traceability records include; name and address of suppliers/customers and a description of the food product, volume or quantity of food product received and supplied, batch or lot numbers and transactions or delivery dates (FSANZ 2008).

Before a decision is made to recall a food product, problems such as chemical contamination, presence of foreign matter, labelling errors and packaging defects would have been identified. However, once the decision has been made to undergo a consumer recall, actions have to be taken in order to ensure the potentially unsafe food does not get to consumers (FSANZ 2008). These actions include; stopping the distribution and sale of the affected product as soon as possible; informing the government authorities and the public concerning the problem; and removing all the potentially unsafe products from the market place in an efficient and effective manner.

One of the most critical aspects of the recall activities involve information management as the supply chain involved has to disseminate information to the government authorities and the general public in order to ensure the affected products are not consumed. Currently, this process is usually conducted through the use of newspapers, television, radio as well as the webpage of the firm and the Australian Competition and Consumer Commission. Whilst this "information-push" strategy is indeed effective in ensuring that the potentially unsafe products are off the shelf, it does however seem to rely on the "hope" that consumers who have purchased the products will not consume it. Therefore, as the FSANZ definition for "recall" suggests, the current strategy ensures the removal of the potentially unsafe products from *distribution and sale* but not necessarily from *consumption*. Firms are legally obliged to follow this process in order to protect themselves, without necessarily following through to ensure the affected products are not consumed. However, performing the legal obligation alone is not sufficient, as the manner in which information dissemination is handled influences consumer confidence in the brand (Verbeke and Ward 2006). This situation thus shows that the current recall mechanism is not foolproof as there is no benchmark to validate the system and it does not have the ability to deal with the intricacies and complexities of the actual consumption of such products.

Therefore, based on evidence about the current situation in Australia, the recall scenario has been identified as a conceptual tool that provides the opportunity to investigate the phenomenon described in the introduction section in detail. Following this, the next section presents the conceptual framework which helps us structure the

research while providing more evidence from the literature supporting the appropriateness of the recall scenario as the foci for primary investigation.

INFORMATION, FOOD AND CONSUMERS: A CONCEPTUAL FRAMEWORK

In developing a conceptual framework for this investigation, a literature review was conducted to identify relevant existing research. From this review, it was possible to develop a conceptual framework involving three overlapping topics of relevance: *information and knowledge optimization*, *food safety information technologies* and *consumer reactions to technology for decision making*. Due to space constraints for this paper, a brief summary is provided on insights generated from the review of literature on the first two topics of interest (information and knowledge optimization and food safety information technologies) while a more detailed review of previous research on consumer reactions to technologies for decision making is presented.

For the detailed review, 117 peer reviewed papers published in English over the last 5 years were identified in the ProQuest database using the keywords “Consumer AND Technology or Information Technology AND Food Chain or Food Industry AND Decision Making” in their titles. From this selection, we will discuss the identified gaps and research challenges which have been used to contribute to the methodology for the investigation.

Information and Knowledge Optimization

In summary, this section of the literature review examines research into the knowledge management strategies that firms are utilising to collect, manage and share information and knowledge along their supply chain. It highlights that most knowledge optimization strategies along food supply chains tend to marginalise the importance of end-consumers. At the broadest level, identified inter-firm knowledge optimization constructs include technology (Maçada et al. 2013), power play (Cai et al. 2013), absorptive capacity (Liu et al. 2009), relational orientation, contractual arrangements (Cheng and Fu 2013), environmental uncertainties (Myers and Cheung 2008) and the knowledge sharing environment (Shih et al. 2012). However, it is noticeable that consumers are rarely formally considered as part of these knowledge management strategies.

More importantly, consumer’s perspectives as individuals who engage in active ‘sensemaking’ has not been considered as a knowledge management issue. But in a situation where consumers have no direct access to accurate and relevant safety information from the firm concerned; how does a consumer make a decision when faced with a food recall situation of a premium perishable food product? From a consumer point of view, sensemaking is useful to the consumers as it helps to provide an explanation of activities that precedes decision making concerning the product (Weick et al. 2005). However, it is unclear how this actually happens as there is limited research concerning the process of sensemaking in consumer decision-making. For firms managing knowledge, a key attribute will be the ability to provide access to dynamic information. In this regard, this section of the review identified some research into the use of technology for knowledge optimization in supply chains including Corso et al. (2010) and Du et al. (2012). Yet, there was no specifically identified study on the applicability of technology as a knowledge optimization construct to address direct information delivery to consumers during a food recall situation. Thus, consumers are faced with uncertainties about the safety of the product in their possession which has the potential to harm their health or lead to unnecessary food wastage if the product is not affected. On the other hand, firms are at risk of a decline in consumer confidence in their brand if consumers cannot gain access to dynamic information about the product’s safety status. This leads to the question being explored in this paper; *how can firms empower end-consumers through the use of technology to facilitate informed decision making about the food products in their possession in a recall situation?*

Food Safety Information Technologies

In summary, this section of the literature review examines research into consumer food safety and the use of information technologies. This section identified a number of gaps in the research literature including a lack of evidence providing insights to how consumers’ perception of the information delivery platforms is influenced by perception of risk, as in the case of a post-recall product scanning. The review highlighted evidence that labels, information sheets, barcodes, 2D barcodes and RFID tags have been researched in relation to nutritional information. However, those who investigated the usability of 2D barcodes (Chrysochou et al. 2009), did not specify the type of 2D barcodes. Therefore, the preferences of consumers regarding the use of QR codes via smart phones remain unclear. Also, there seems to be very limited evidence on the preferences of consumers on the use near field communication (NFC) tags via smart phones.

There is evidence (Cornelisse-Vermaat et al. 2008b; Voordouw et al. 2011) suggesting that some consumers prefer the use of labels and information sheets because of their educational and technological background, but it remains unclear how applicable these insights may be to Australian consumers. Based on the evidence, the range of information delivery platforms worthy of exploration in this research include labels, information sheets, DataBar, QR code and NFC tag. Furthermore, based on the results of the study conducted by Reid et al. (2001),

it is relevant to consider the application of food related lifestyle consumer categorization to this study, as Van Rijswijk and Frewer (2012) have highlighted the importance of consumer categorization as a pre-requisite for determining the influence of any information delivery platform on different types of consumers. Finally, as Solomon et al. (2009) has argued that the form in which information is presented is highly important, it will be valuable to investigate the influence of textual, verbal, visual and integrated information within the appropriate information delivery platform.

Based on insights from this section of the review, this research identified the need to explore the use of the food recall scenario to investigate the perceptions of Australian consumers with respect to information presented in different modes/styles/forms and different levels of complexity of information via a variety of information delivery platforms to try to understand what optimises knowledge transfer in food safety situations.

Consumer Reactions to Technologies for Decision Making

Focused on consumers, the articles reviewed shows that a lot of work has been done concerning technologies that assist in decision making as well as the adoption and expected use of these technologies. However, there is limited research on the actual usability of these technologies. In addition, all the articles reviewed showed the gaps in the method employed in these investigations. Based on these insights, the articles have been grouped in terms of *technologies for decision making*, *adoption and use of technology by consumers*, *usability of technology by consumers* and *research methods*. Following this, a table derived from the review which highlights the research challenges that has been used to contribute to the methodology is presented.

Technologies for Decision Making

With rapid improvements in technology (Murray et al. 2010), consumers can indeed have access to relevant information such that they can make decisions after their knowledge about the phenomenon of interest has been optimized. It was interesting to note that consumers have been able to make use of technology as a knowledge optimizing tool, in order to make decisions in many areas except food recall. Therefore, consumers are faced with uncertainties about the safety of the product in their possession which has the potential to harm their health or lead to unnecessary food wastage if the product is not affected. Similar studies considered the impact of traceability information carriers, such as linear barcodes, radio frequency identification devices (RFID) tags, laser technologies, DNA based technologies and e-paper tags, on consumers' perception (Beitelspacher et al. 2012; Chrysochou et al. 2009). Another study considered consumer perceptions on the use of internal tag technology which is an insertion of 'internal tags' into food and natural health products (Lilavanichakul and Boecker 2013). However, despite these fascinating studies, it appears that the capabilities of these technologies have not been extended to reach their full potentials as the information provided by the technologies are pre-programmed and focused on nutritional and country of origin details. Consequently, they are not informative in a recall situation where dynamic information about the safety status of the food product is required to make decisions.

Some other areas where technology has been useful in helping consumers with decision making concerns banking (Patsiotis et al. 2013), online shopping (Yang and Forney 2013), and personal ICT use including social media (Thong et al. 2011). More interesting is the study conducted by Murray et al. (2010, p. 233) about the use of assistive technologies which refers to "a group of tools that help consumers make better choices, with less effort, when faced with daunting data and limited time". The term, encapsulates the different uses of technologies for consumer decision making, mentioned earlier. However, the definition seems inadequate for a recall situation in that consumers are usually not faced with daunting data but the lack of it. During a food recall, there is need to afford consumers the opportunity to 'pull information' directly from the firm concerned not just to alleviate consumers' uncertainties about the safety of their food but to, some extent, retain their confidence in the brand.

Here, we have identified gaps in the literature in that consumers have been able to make use of technology as a knowledge optimizing tool, for decision making in many areas except food recall. More importantly, it remains unclear how these consumers make sense of the knowledge acquired through the use of technology and how they respond to it based on their individual differences. Therefore, as specified in the introduction section, we intend to explore how consumers interact with technology-based information delivery mechanisms and how attributes of consumers indeed influence their responses and decisions.

Adoption and Use of Technology by Consumers

Consistent with the review conducted by Dwivedi et al. (2010) the articles reviewed showed that many studies have indeed investigated the factors influencing technology adoption by consumers based on the Technology Acceptance Model (TAM) and various modified versions. Such studies found that the factors influencing consumers' adoption of technology include *the quality of the system/technology* in terms of the web site design, customer service, privacy/security, experiential quality (Ha and Stoel 2009), relative advantage (perceived

usefulness), complexity, compatibility, trial-ability, observability (Md Nor et al. 2010), innovativeness (Yang 2010), perceived enjoyment (Lee and Chang 2011). It also includes *consumer lifestyles* in terms of fashion consciousness, leisure orientation, Internet involvement, and e-shopping preference (Lee et al. 2009) as well as *environmental influences* in terms of peer and superior influences and *individual differences* in terms of self-efficacy (Md Nor et al. 2010; Yang 2010).

A few other studies focused on the Unified Theory of User Acceptance and Use of Technology (UTAUT) model in which they believe that the purpose of technology use (Thong et al. 2011) and technology anxiety (Yang and Forney 2013) are factors influencing consumers' adoption of technology. More interesting is the study conducted by Robertson (2012) who incorporated the Media Richness Theory (MRT) into an investigation of consumers' motives for their choice of complaint channel in the context of self-service technology (SST) failure. Although, MRT is largely used in organisational behaviour, it has been applied to other contexts; perhaps it could be useful in a recall situation as information needs to be communicated with consumers who may have purchased potentially unsafe food products. MRT involves matching the most appropriate medium, or channel, to the communication task which is characterised by equivocality (i.e. the level of ambiguity or confusion that occurs during the communication task, such as a consumer might experience when trying to comprehend the recall announcement) and uncertainty (i.e. communication tasks where there is a lack of information, such as where consumers require adequate instructions concerning steps to take when in possession of a potentially unsafe food product whilst avoiding unnecessary wastage) (Robertson 2012). While this theory seems interesting and could be valuable to the context defined in this study, there is lack of evidence suggesting that MRT has been explored for the purpose of integrating technology with rich media content in order to empower end-consumers to inform their decision making.

Here, we have identified a limitation in the literature as researchers have largely focused on TAM and UTAUT theories while there is limited exploration, application and use of other theories that are potentially useful to the phenomenon being investigated. More specifically, as we have identified the potentials of the applicability of the MRT theory in the recall scenario, it remains unclear which information delivery channel/mode is appropriate for communicating with different types of consumers during a recall situation. Therefore, as specified in the introduction section and according to the context defined for this study, we intend to explore the MRT while investigating channels of information delivery and how it influences different types of consumers.

Usability of Technology by Consumers

As the main objective of usability testing deals with ensuring the product meets the actual needs of the intended audience – in this case the consumers (Rogers et al. 2011). This review showed there is lack of evidence suggesting that usability testing was conducted with consumers, concerning technologies designed to help their decision making, especially in food chains. The focus was largely on the adoption and expected use of these technologies, not so much on its design and implementation in a way that facilitates the intended use for different types of consumers, as one size does not fit all and as the expected outcome of use is not tantamount to the actual outcome of use.

Therefore, in consonance with Murray et al. (2010), we intend to consider the intricacies of the design and implementation of information delivery solutions such that it facilitates the intended use for different types of consumers within the context defined for this study.

Research Methods

Amongst the articles reviewed in this study, it was indeed noted that only about 15% of all those articles made use of qualitative research methods in conducting their investigation. The largest percentage focused on quantitative methods while a few others conducted reviews of the literature. While it is not being suggested here that one method is better than the other, it was interesting to note that none of the studies complemented the chosen method with another; thereby using a mixed method approach given the strengths and weaknesses in a single method approach (Tashakkori and Creswell 2007). As the studies reviewed were *consumer* focused, it becomes questionable if a high regard is not placed on the reality of and the influence of the inner world of human experience in action (Johnson and Onwuegbuzie 2004). On the other hand, *firms* who offer these technologies to consumers remain conscious of their return on investment (ROI), hence a strong and practical empiricism as a path to determine what works, cannot be ignored. Therefore, it can be argued that this complicated phenomenon should be investigated in a way that recognises “the existence and importance of the natural or physical world as well as the emergent social and psychological world that includes language, culture, human institutions, and subjective thoughts” (Johnson and Onwuegbuzie 2004, p. 18), which is a classic characteristic of mixed methods research design. Therefore, we will consider incorporating a mixed method design approach in this study.

Review Contributions to the Methodology

From a preliminary investigation, some research gaps and challenges have been identified and will form the basis for further research concerning how firms can indeed empower end-consumers such that they can use technology to inform their decision making about the food products in their possession during a recall situation. Based on the review, this work draws on the interplay of theories from usability studies, theories on consumer focused sensemaking and the media richness theory which will be useful in the development of the food safety tool. The Table 1 below identifies foci for future studies relevant to consumer decision making technologies for food recalls. The table was developed as a result of the literature review, drawing on the major issues and discussions of past research. It incorporates the nuances of the food recall situation which contextualizes the phenomenon under investigation.

Table 1: Key Research Challenges for Investigating the Use of Technology for Consumer Decision Making in Food Recalls.

S/N	Perceived Gaps	References	Research Directions	Research Challenges
1	Contexts of technology use have not been extended to reach its full potentials.	For example; Kim et al. (2012); Song et al. (2012)	Investigate the use of technology in a recall situation where dynamic information about the safety status of the food product is required to make decisions.	1. What information do consumers need during a recall situation? 2. What are consumers' perceptions of the impact of food quality and safety information?
2	Many studies have considered the factors affecting consumers' adoption and use of technology drawing on only the TAM and UTAUT theories without considering the applicability of other theories.	For example; Thong et al. (2011); Yang (2010)	Explore other applicable theories such as the MRT, so as to get a broader perspective of the phenomenon under study.	1. What role can the media richness theory play in integrating technology with rich media content in order to empower end-consumers such that they can inform their decision making about the food products in their possession during a recall situation? 2. What other theories can explain the factors affecting consumers' adoption, use and design preferences in the food chain?
3	There is much focus on single method designs which was incorporated in all the studies reviewed; thus not drawing on the strengths of other methods.	For example; Kim et al. (2012); Patsiotis et al. (2013);	As this tricky phenomenon deals with consumers (largely subjective) and firms who make the technologies available (largely objective because of their ROI); consider the use of mixed method designs.	1. As consumers are largely subjective, what methodological technique(s) could indeed minimize or totally eradicate the attitude-behaviour gap? 2. What methodological tools could be helpful in identifying the actual impact of diverse information delivery channels?
4	There is much focus on adoption and use of technologies, but little on the impact of various designs. More specifically, there is little research on usability studies in the context of this study.	For example; Md Nor et al. (2010); Yang (2010)	Investigate the impact of various designs of information systems on consumer decision making in food chains.	1. How can the optimization of technology-based information delivery mechanisms support consumers during a recall? 2. What are consumers' preferences in relation to different information designs based on diverse delivery platforms?

METHODOLOGY

This research-in-progress has been approved by the Tasmanian Social Sciences Human Research Ethics (H14010). The study is based on an interpretive research philosophy and deploys a mixed-method design approach structured in three overlapping phases. Phase 1 involves the conduct of 10 case studies on the business-focused aspect of the study. To date, one initial case study with an Australian premium food producer has been completed and will be discussed in more detail below. This case has already contributed important insights into the firm response to food recall situations and the associated information and knowledge flows. Phase 1 also involves interaction with premium food consumers whose perspectives and preferences on food safety will be obtained using a questionnaire instrument. Combined, the firm and consumer data will generate insight into current food quality and safety information provided to consumers during the recall of a perishable product and consumer preferences for information during these recall incidents.

In Phase 2, the research will develop and evaluate a diverse range of smart phone compatible information designs (textual, visual, verbal, integrated) for each technology-based information delivery platform (DataBar, QR code and NFC tag) on consumers classified into different groups. Usability testing will be conducted through the use of scenarios in focus groups in order to identify consumers' preferences in relation to the information designs based on the delivery platforms; compare it to the paper based (labels and information sheets) information delivery platforms; and support rich understanding of consumers' perceptions of the impact of the information. Following each focus group session, a validated questionnaire instrument that has been designed to measure consumer confidence in food safety (de Jonge et al. 2008) will be utilized in order to collect secondary data. This will lead to the development of a theoretical optimization model for the use of technology-based information delivery platforms in relation to consumer preferences in recall situations. Phase 3 involves an evaluation of the model that will be iteratively refined based on practical insights generated from further interactions with food firms and food consumers.

PRELIMINARY FINDINGS FROM INITIAL CASE STUDY

Based on the business side of the Phase 1, an initial case study with a premium food firm using semi-structured interviews and document reviews has been completed. This case study has already generated a number of important insights into the following: food recall issues and their implications on the firm; enhanced understanding of the information and knowledge processes and flows; generated insight into the communication methods currently used with consumers during a recall incident; identified the nature and type of information provided to consumers immediately the recall occurred and after the safety situation was rectified, identified the type of consumer classification the firm currently has and contributed to an understanding of the firm's perceptions of the dynamics and types of information that influence consumer confidence in their product.

This South Australian food firm produces premium food products and was selected due to a recently experienced food recall incident. Due to the sensitivity of the context of the investigation and the confidentiality agreement, further details about the firm cannot be provided as information such as the category of the food recalled can easily compromise the identity of the firm.

This case study provided evidence of internal conflicts within the food industry on the provision of information on quality, safety and other information to consumers. Furthermore, it was earlier conceptualised that the consumers would be classified in order to calibrate their responses effectively while investigating their perceptions of the impact of food quality and safety information. This is supported by a respondent who explained the consumer classification relevant to their firm, suggesting that consumers are classified in terms of their disposable income.

...We classify customers perhaps in terms of disposable income because the [product] isn't cheap. It's a high end product, the range is broken up into three...high end - uncommon offering, mainstream and ... bulk.

The preliminary findings also provide a direction for the design and development of the information delivery platform in this overall study. The findings suggest that information designs should be less technical, less time-consuming and more aesthetic rather than focusing on a technology-savvy design so as to cater for a broad range of Australian consumers.

...my husband does not use a mobile phone. No, he does, just to ring me and he's just started learning how to text. So, he is one of those people that fall into that category, so the demography then is interesting because you look at 18 to 35 year old [who] are very interested in food and they are smart phone users. Tick. Then you've got your 36 to 50 ... [Tick]. Then you've got 50 to 60 year olds and 60+ and that's not smart phone, that's not website...and I still want people in here (50+) [to have access to my story] and ...that's where I've got to get them. It is mainly with my story and then, to me, that is a really important part to [premium consumers]. ...I

think that if we really start looking at how people operate its, pretty quick. ... I question the validity and importance of the website because of time in some ways.

The snapshot of the respondent's comment also suggests that paper based information delivery platforms are still important to a certain class of consumers while others may not have the patience and ability to read detailed information on websites. However, as corroborated by the respondent, firms do face challenges about associating information sheets with their products in stores; as information platforms over and above the labels are not allowed. *...how are you going to get an information sheet containing the story to the shelf space? You won't be allowed to put it there.* This situation begs the question, is it worthwhile to continue to pursue paper-based information delivery platforms given the restrictions on information transparency? These preliminary findings thus provide an interesting insight into the future directions of the research from the firms' perspective. Further investigations from the consumers' perspectives, will provide deeper insights towards consumer perceptions on the design and development of the information delivery solution. Combined, these will support the research to be conducted in Phases 2 and 3 as described above.

DISCUSSION

Insights from the literature and evidence from the initial case study establish the conceptual framework for this study while confirming that some firms focusing on premium products for a niche market are indeed willing to share information with their end-consumers on safety and quality, even though they are still unsure of how to optimise these information systems. Food businesses have the need to better understand how differences in consumer's attributes influence their receipt and use of any information provided and in-turn how this influences the decisions that consumer's make both around individual purchases and also over-time around food types and brands. However, there are some barriers. Apart from the industry resistance caused by the corporatized and multi-national structure of much global food production (*see introduction section*), the food firms who are willing to share do not seem to know how to do so. We also identify reasons why firms do not know what they should be doing and these are;

1. Failure to understand the mode of differentiating and classifying consumers when considering information consumption as the reason for the classification.
2. Failure to understand consumer reception of information and their reaction towards it.
3. Failure to understand how consumer attribute differences influence their reception and use of information for consumer decision making.
4. Failure to understand how to utilise channels for information delivery in a targeted manner for the intended audience.

Moving forward, this leads to insights about how the method should evolve for the consumer focused aspect of the investigation in order to determine what forms of information delivery, modes of interaction and levels of content complexity are most appropriate and/or effective for different types of consumers. Consequently, there is need to consider the food related lifestyle consumer categorization, as well as other ways in which consumers can be classified for the purpose of this research. In addition, as the method evolves, incorporating an eye-tracking mechanism (for example; [Sticky Ad](#)) in order to determine consumers' visual attention for each of the different information delivery solutions could be useful in the Phase 2 of this study.

CONCLUSION

This preliminary investigation serves as an initial effort into an investigation about how firms can empower end-consumers through the use of technology in order to facilitate informed decision making about the food products in their possession in a recall situation. This paper has identified the gaps in the literature, the key research challenges that enable researchers understand how to unpack and investigate the phenomenon under study. As the importance of the nuances created by the food industry on supply chain and information systems research has reflected from this paper, it becomes clearer that these research challenges are worthy of further investigation. Hence, it is anticipated that academics will begin to investigate these issues with a more industry-specific lens.

Future work will involve the completion of the other 9 case studies in order to establish strong insights from the firm-focused aspect of Phase 1. Following this, we will progress to Phase 2, where we will develop a range of smart phone compatible information designs for each information platforms on different types of consumers. This will be evaluated and will lead to the development of the theoretical optimization model. Finally, in Phase 3, we will evaluate and iteratively refine the model based on practical insights from further investigations.

REFERENCES

- ACCC. 2014. "Product and Safety Recalls Australia - Food and Groceries," A.C.a.C. Commission (ed.).
- AMCHAM. 2014. "Thailand - Foreign Trade Barriers ". Pathumwan, Bangkok: The American Chamber of Commerce in Thailand, pp. 489-497.
- Barker, D. 2014. "Transatlantic Trade and Investment Partnership (Ttip) - Impacts on Food and Farming," in: *Trade Matters*. Washington DC: Centre for Food Safety.
- Beitelspacher, L. S., Hansen, J. D., Johnston, A. C., and Deitz, G. D. 2012. "Exploring Consumer Privacy Concerns and Rfid Technology: The Impact of Fear Appeals on Consumer Behaviors," *Journal of Marketing Theory and Practice* (20:2), pp. 147-159.
- Böcker, A. 2002. "Consumer Response to a Food Safety Incident: Exploring the Role of Supplier Differentiation in an Experimental Study," *European Review of Agricultural Economics* (29:1), pp. 29-50.
- Cai, S., Goh, M., de Souza, R., and Li, G. 2013. "Knowledge Sharing in Collaborative Supply Chains: Twin Effects of Trust and Power," *International Journal of Production Research* (51:7), p. 2060.
- Capling, A., and Ravenhill, J. 2011. "Multilateralising Regionalism: What Role for the Trans-Pacific Partnership Agreement?," *The Pacific Review* (24:5), pp. 553-575.
- Cheng, J. H., and Fu, Y. C. 2013. "Inter-Organizational Relationships and Knowledge Sharing through the Relationship and Institutional Orientations in Supply Chains," *International Journal of Information Management* (33:3), pp. 473-484.
- Chrysochou, P., Chrysochoidis, G., and Kehagia, O. 2009. "Traceability Information Carriers. The Technology Backgrounds and Consumers' Perceptions of the Technological Solutions," *Appetite* (53:3), pp. 322-331.
- Cornelisse-Vermaat, J. R., Voordouw, J., Yiakoumaki, V., Theodoridis, G., and Frewer, L. J. 2008b. "Food-Allergic Consumers' Labelling Preferences: A Cross-Cultural Comparison," *The European Journal of Public Health* (18:2), pp. 115-120.
- Corso, M., Dogan, S. F., Mogre, R., and Perego, A. 2010. "The Role of Knowledge Management in Supply Chains: Evidence from the Italian Food Industry," *International Journal of Networking and Virtual Organisations* (7:2), pp. 163-183.
- de Jonge, J., van Trijp, H. C. M., van der Lans, I. A., Renes, R. J., and Frewer, L. J. 2008. *A Scale for Consumer Confidence in the Safety of Food*. Wageningen: Mansholt Graduate School of Social Sciences.
- DPMC. 2012. "Australia in the Asian Century," D.o.t.P.M.a. Cabinet (ed.). Canberra.
- Du, T. C., Lai, V. S., Cheung, W., and Cui, X. 2012. "Willingness to Share Information in a Supply Chain: A Partnership-Data-Process Perspective," *Information & Management* (49:2), pp. 89-98.
- Dwivedi, Y. K., Williams, M. D., Lal, B., and Mustafee, N. 2010. "An Analysis of Literature on Consumer Adoption and Diffusion of Information System/Information Technology/Information and Communication Technology," *International Journal of Electronic Government Research* (6:4), pp. 58-73.
- FSANZ. 2008. "Food Industry Recall Protocol - a Guide to Conducting a Food Recall and Writing a Food Recall Plan," F.S.A.N. Zealand (ed.).
- Grunert, K. G. 2005. "Food Quality and Safety: Consumer Perception and Demand," *European Review of Agricultural Economics* (32:3), pp. 369-391.
- Ha, S., and Stoel, L. 2009. "Consumer E-Shopping Acceptance: Antecedents in a Technology Acceptance Model," *Journal of Business Research* (62:5), p. 565.

- Heinonen, K. 2011. "Consumer Activity in Social Media: Managerial Approaches to Consumers' Social Media Behavior," *Journal of Consumer Behaviour* (10:6), pp. 356-364.
- Johnson, R. B., and Onwuegbuzie, A. J. 2004. "Mixed Methods Research: A Research Paradigm Whose Time Has Come," *Educational researcher* (33:7), pp. 14-26.
- Kearney, J. 2010. "Food Consumption Trends and Drivers," *Philosophical transactions of the royal society B: biological sciences* (365:1554), pp. 2793-2807.
- Kim, J., Christodoulidou, N., and Brewer, P. 2012. "Impact of Individual Differences and Consumers' Readiness on Likelihood of Using Self-Service Technologies at Hospitality Settings," *Journal of Hospitality & Tourism Research* (36:1), pp. 85-114.
- Lee, H.-J., Lim, H., Jolly, L. D., and Lee, J. 2009. "Consumer Lifestyles and Adoption of High-Technology Products: A Case of South Korea," *Journal of International Consumer Marketing* (21:2), p. 153.
- Lee, H. H., and Chang, E. 2011. "Consumer Attitudes toward Online Mass Customization: An Application of Extended Technology Acceptance Model," *Journal of Computer-Mediated Communication* (16:2), pp. 171-200.
- Lilavanichakul, A., and Boecker, A. 2013. "Consumer Acceptance of a New Traceability Technology: A Discrete Choice Application to Ontario Ginseng," *International Food and Agribusiness Management Review* (16:4), pp. 25-49.
- Liu, H., Li, X. Y., Zhang, C. L., and Ieee. 2009. *Why Absorptive Capacity Is More Essential in Some Situations? The Contingency View of Supply Chain Knowledge Sharing*.
- Maçada, A. C. G., Costa, J. C., Oliveira, M., and Curado, C. 2013. "Information Management and Knowledge Sharing in Supply Chains Operating in Brazil," *International Journal of Automotive Technology and Management* (13:1), p. 18.
- Md Nor, K., Moga, L. M., and Yoruk, D. 2010. "Consumer Attitudes Regarding Information Technology Usage," *Annals of "Dunarea de Jos" University of Galati: Fascicle 1: Economics and Applied Informatics* (16:1), pp. 13-18.
- Michaelidou, N., Siamagka, N. T., and Christodoulides, G. 2011. "Usage, Barriers and Measurement of Social Media Marketing: An Exploratory Investigation of Small and Medium B2b Brands," *Industrial marketing management* (40:7), pp. 1153-1159.
- Murray, K. B., Liang, J., and Häubl, G. 2010. "Act 2.0: The Next Generation of Assistive Consumer Technology Research," *Internet Research* (20:3), pp. 232-254.
- Myers, M. B., and Cheung, M.-S. 2008. "Sharing Global Supply Chain Knowledge," *MIT Sloan Management Review* (49:4), pp. 67-73.
- Patsiotis, A. G., Hughes, T., and Webber, D. J. 2013. "An Examination of Consumers' Resistance to Computer-Based Technologies," *The Journal of Services Marketing* (27:4), pp. 294-311.
- Prinsloo, N., Van der Merwe, D., Bosman, M., and Erasmus, A. 2012. "A Critical Review of the Significance of Food Labelling During Consumer Decision Making," *Journal of Family Ecology and Consumer Sciences= Tydskrif vir Gesinsekologie en Verbruikerswetenskappe* (40), pp. 83-98.
- Reid, M., Li, E., Bruwer, J., and Grunert, K. 2001. "Food-Related Lifestyles in a Cross-Cultural Context: Comparing Australia with Singapore, Britain, France and Denmark," *Journal of Food Products Marketing* (7:4), pp. 57-75.
- Robertson, N. 2012. "Self-Service Technology Complaint Channel Choice: Exploring Consumers' Motives," *Managing Service Quality* (22:2), pp. 145-164.

- Rogers, Y., Sharp, H., and Preece, J. 2011. *Interaction Design: Beyond Human-Computer Interaction*. John Wiley & Sons.
- Ruiz-Garcia, L., Steinberger, G., and Rothmund, M. 2010. "A Model and Prototype Implementation for Tracking and Tracing Agricultural Batch Products Along the Food Chain," *Food Control* (21:2), pp. 112-121.
- Shih, S. C., Hsu, S. H. Y., Zhu, Z. W., and Balasubramanian, S. K. 2012. "Knowledge Sharing-a Key Role in the Downstream Supply Chain," *Information & Management* (49:2), pp. 70-80.
- Solomon, M. R., Polegato, R., and Zaichkowsky, J. L. 2009. *Consumer Behavior: Buying, Having, and Being*. Pearson Prentice Hall Upper Saddle River, NJ.
- Song, J., Drennan, J. C., and Andrews, L. M. 2012. "Exploring Regional Differences in Chinese Consumer Acceptance of New Mobile Technology: A Qualitative Study," *Australasian Marketing Journal (AMJ)* (20:1), pp. 80-88.
- Stachowski, C. A. 2012. "The Niche Marketing Strategy in Internationally-Oriented Small and Medium Enterprises: A Literature Review and Lessons for New Zealand," *Small Enterprise Research* (19:2), pp. 96-112.
- Tashakkori, A., and Creswell, J. W. 2007. "Editorial: The New Era of Mixed Methods," *Journal of mixed methods research* (1:1), pp. 3-7.
- Thong, J. Y. L., Venkatesh, V., Xu, X., Hong, S. J., and Tam, K. Y. 2011. "Consumer Acceptance of Personal Information and Communication Technology Services," *IEEE Transactions on Engineering Management* (58:4), p. 613.
- Van Rijswijk, W., and Frewer, L. J. 2012. "Consumer Needs and Requirements for Food and Ingredient Traceability Information," *International Journal of Consumer Studies* (36:3), pp. 282-290.
- Verbeke, W., and Ward, R. W. 2006. "Consumer Interest in Information Cues Denoting Quality, Traceability and Origin: An Application of Ordered Probit Models to Beef Labels," *Food Quality and Preference* (17:6), pp. 453-467.
- Voordouw, J., Cornelisse-Vermaat, J. R., Pfaff, S., Antonides, G., Niemietz, D., Linardakis, M., Kehagia, O., and Frewer, L. J. 2011. "Preferred Information Strategies for Food Allergic Consumers. A Study in Germany, Greece, and the Netherlands," *Food Quality and Preference* (22:4), pp. 384-390.
- Weick, K. E., Sutcliffe, K. M., and Obstfeld, D. 2005. "Organizing and the Process of Sensemaking," *Organization Science* (16:4), pp. 409-421.
- Yang, K. 2010. "The Effects of Technology Self-Efficacy and Innovativeness on Consumer Mobile Data Service Adoption between American and Korean Consumers," *Journal of International Consumer Marketing* (22:2), p. 117.
- Yang, K., and Forney, J. C. 2013. "The Moderating Role of Consumer Technology Anxiety in Mobile Shopping Adoption: Differential Effects of Facilitating Conditions and Social Influences," *Journal of Electronic Commerce Research* (14:4), pp. 334-347.

COPYRIGHT

Adeola Bamgboje-Ayodele, Leonie Ellis and Paul Turner © 2014. The authors assign to ACIS and educational and non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to ACIS to publish this document in full in the Conference Papers and Proceedings. Those documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the authors.